



FRONTIER FERTILIZER SUPERFUND SITE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY • REGION 9 • DECEMBER 2002

EPA Completes Planned Characterization of Site Contamination

In May 2002, EPA completed planned characterization activities at the Frontier Fertilizer site in Davis, California. The site characterization activities included extensive sampling of soil, soil gas, and groundwater to better define the nature and extent of contamination. This fact sheet summarizes the results of these investigations.

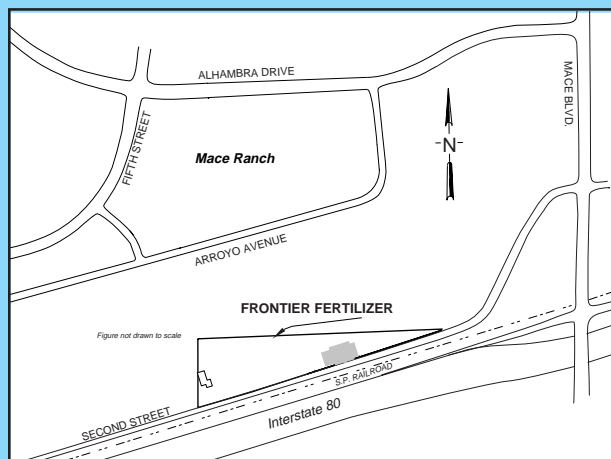


Figure 1: Location of Frontier Fertilizer Superfund Site

At a Glance...

- EPA has completed planned activities to characterize the contamination.
- EPA has more precisely defined the plumes of contaminated groundwater.
- EPA has more precisely defined the areas of contaminated soil.
- Groundwater contamination is not close to the nearest drinking water supply well. EPA has installed “sentinel” wells to provide early warning if contamination approaches that well.
- EPA has added wells designed to remove contaminated groundwater.
- EPA plans to replace existing pipelines, build a new main north/south pipeline, and connect extraction wells to the treatment system next year.

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Is my drinking water safe?



Yes! City of Davis wells do not draw water from the contaminated aquifer (see page 3).

Site History

The eight-acre Frontier Fertilizer site has been used for a variety of purposes since the 1950s, including housing for migrant laborers, a tomato washing station, grain storage, equipment maintenance facilities, and a fertilizer and pesticide distribution center. Local and state environmental agencies became involved with the site in 1983 after an employee's dog died following exposure to liquid pesticides in an unlined disposal basin. Early investigations showed that the principal contaminants in soil and groundwater were a solvent, carbon tetrachloride (CCl₄), and three pesticides: ethylene dibromide (EDB), 1,2-dichloropropane (DCP), and 1,2-dibromo-3-chloropropane (DBCP).

During the 1980s, the State of California assessed soil and groundwater contamination, partially excavated contaminated soil from the disposal basin, and installed an interim groundwater extraction and treatment system. In 1994, EPA placed the site on the National Priorities List of Superfund sites and assumed responsibility for investigation and remediation efforts. After taking over the site, EPA expanded the groundwater extraction system and installed an extensive network of groundwater monitoring wells. Today, EPA routinely samples 86 groundwater monitoring wells and analyzes the water for 60 chemical constituents. The groundwater extraction system captures a total of 60 gallons per minute from 16 extraction wells.

Four water-bearing zones underlie the Frontier Fertilizer property and the Mace Ranch subdivision (Figure 3). These zones are separated by layers of clay which impede groundwater movement between the zones. The shallow zone, called the S-1, extends from approximately 25 to 50 feet below ground surface (bgs). The S-2 zone extends from approximately 60 to 90 feet bgs. The A-1 aquifer extends from approximately 110 to 130 feet bgs.

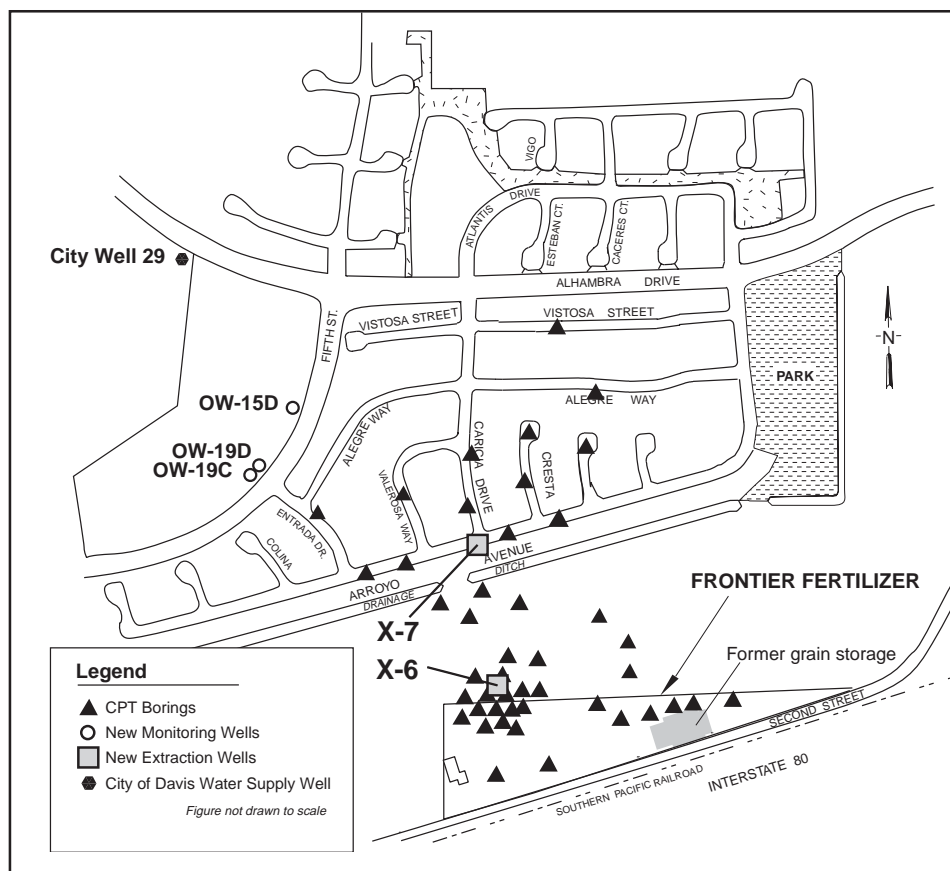


Figure 2: Locations of new wells. Additional wells are located in the subdivision, in the field and on-site.

Recent Activities at the Site

Soil and groundwater sampling

In fall/winter 2001 and spring 2002, EPA and its contractors conducted soil and groundwater investigations near the former waste disposal pits, in the field north of the site, and in the Mace Ranch subdivision. Our purpose was to better define the geology of the site and the extent of groundwater contamination from the site (Figure 2). To collect these samples, we used a drilling method called Cone Penetration Testing (CPT) as well as a standard drilling rig. The results of this field work will guide the expansion of the Frontier Fertilizer groundwater extraction and treatment system.

DNAPL investigation

A dense nonaqueous phase liquid (DNAPL) is a form of contamination that is denser than water and does not easily dissolve in or mix with water. DNAPLs are a concern at hazardous waste sites because they may act as continuing sources of groundwater contamination for many years. They are typically difficult to locate and remove from the subsurface.

Frontier's site history and groundwater analytical results suggest the presence of DNAPL in the pesticide source area. To evaluate this possibility, EPA has used several DNAPL investigative techniques in the past, which did not indicate the presence of DNAPL. In December 2001, we tried a relatively new DNAPL investigative technique, the FLUTE^(TM) sampler, in the pesticide source area. The Flexible Liner Underground Testing (FLUTE)

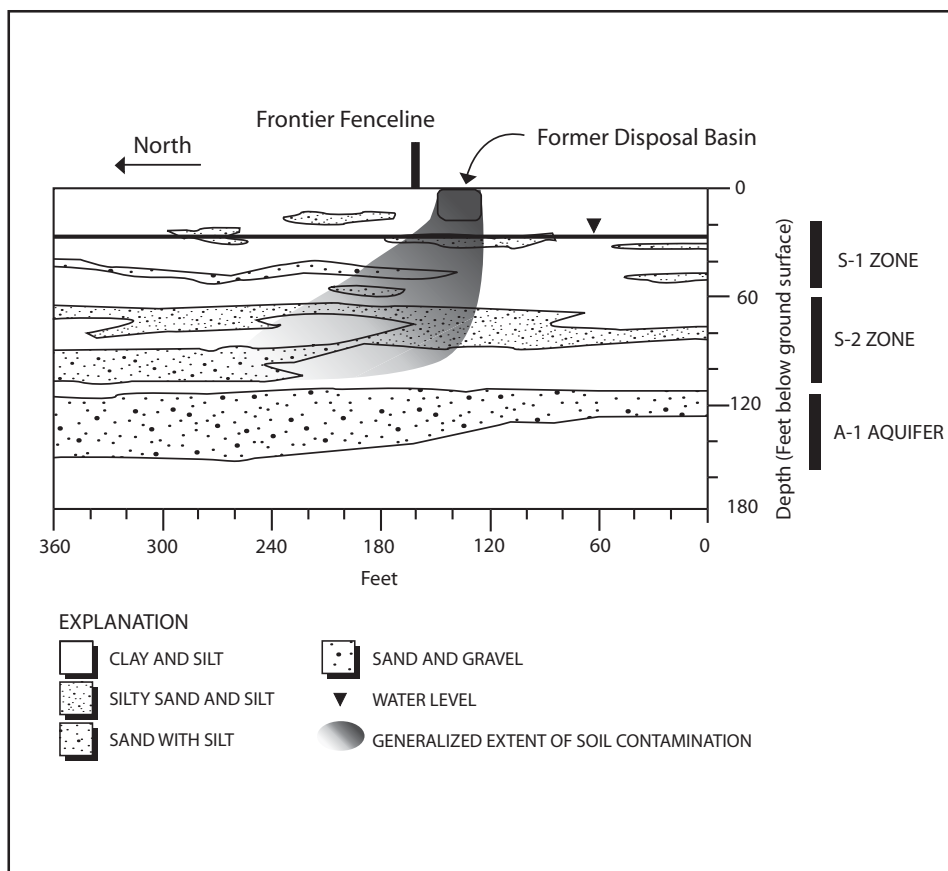


Figure 3: *Soil contamination cross section*

method uses a dye-impregnated flexible liner which is inserted into an open borehole and pressurized against the borehole walls. If DNAPLs come into contact with the flexible liner, the dye changes color. When the liner is removed, the location of the dye stain indicates the depth of DNAPL contamination. The FLUTE system was used in three highly contaminated boreholes in the pesticide source area but once again we detected no DNAPL.

Groundwater monitoring

In December 2001, EPA's contractors installed three monitoring wells (Figure 2: OW-15D, OW-19C, OW-19D) on Fifth Street between Entrada Drive and Alhambra Drive. These wells allow us to monitor groundwater in the A-1 zone between the Frontier Fertilizer plume and the nearest city drinking water well (City of Davis

Well 29) on Alhambra Drive. We have no indication that contaminated groundwater has migrated as far as Fifth Street, but these wells will serve as "sentinel" wells to detect site-related contaminants should they move that far.

New extraction wells

In November 2001, EPA's contractors installed two new sets of groundwater extraction wells (Figure 2): the X-6 set immediately north of the former waste disposal pits and the X-7 set near the intersection of Arroyo Avenue and Caricia Drive. Wells at X-6 are designed to capture high-concentration groundwater contamination in the pesticide source area. Wells at X-7 were installed near the intersection of Caricia and Arroyo to capture elevated levels of contamination in that area. We anticipate that the X-6 and X-7 extraction wells will be connected to

Is my drinking water safe?

Yes! Although groundwater contamination has occurred, City of Davis drinking water wells do not draw water from the contaminated area.

The nearest drinking water well, City of Davis Well 29, is located approximately 1200 feet northwest of the leading edge of the Frontier Fertilizer groundwater plume. The well draws water from 700 to 1500 feet below ground surface, which is much deeper than the zone of contamination (25 to 130 feet below ground surface). The EPA analyzes water samples from City Well 29 four times per year. We have detected no site-related contaminants in these water samples. In addition, the City conducts its own tests of this and other city-operated wells to ensure that it meets federal and state standards. The City, like any municipal or commercial supplier, must report any violations of the water quality standards to its customers and to regulatory agencies.



the on-site treatment system in 2003 when the groundwater pipeline network is rebuilt and the new north-south trunk line is installed.

Results of Recent Sampling

The following results are reported in the Remedial Investigation Supplemental Report #2, which will soon be available at the records repositories for the site.

Soil Contamination in Former Waste Pits Area

The recent soil sampling identified a zone of soil contamination extending from near the ground surface down to about 30 feet below ground surface in

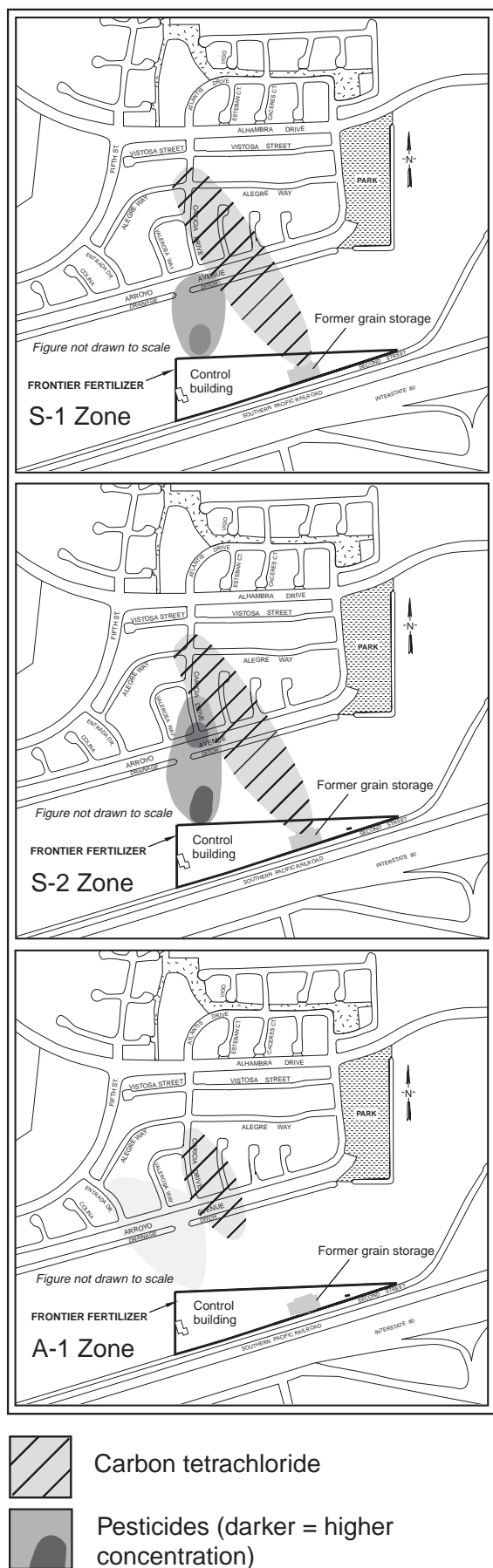


Figure 4: *Contaminant plumes*

the area right next to the former disposal basin (Figure 3). This finding supports previous reports indicating that more than one disposal basin may have been in use at the site and closed before the discovery of the 1983 disposal basin. Soil samples collected about 60 feet north of the pesticide disposal basin show contamination about 30 to 80 feet deep, although at much lower concentrations than the shallow soil contamination near the former disposal basin. We now have a much better idea of the amount and vertical distribution of contamination. We will use this information to develop and evaluate potential cleanup options for the source area.

Soil Gas Contamination in the Vicinity of the Former Waste Pits Area

In November 2001, soil gas samples were collected at the former disposal basin and immediately north of the disposal basin. Soil gas sampling measures the concentration of chemicals that may exist in vapor form in the spaces between soil particles. Samples were collected from 13 locations at depths of 10 and 20 feet below ground surface. In general, the soil gas concentrations measured in 2001 were lower than the concentrations measured in 1997. The maximum DCP soil gas concentration detected during the 1997 sampling effort was 19,406 parts per billion by volume (ppbV) and the maximum DCP soil gas concentration detected in the 2001 effort was 11,366 ppbV. The corresponding 1997 and 2001 maximum EDB soil gas concentrations were, respectively, 320 and 106 ppbV.

The lower soil gas concentrations detected in 2001 relative to 1997 indicate that the risk calculations performed for the 1999 Baseline Risk Assessment remain protective.

Groundwater Contamination: Pesticides

Groundwater immediately north of the former pesticide disposal basin contains elevated concentrations of EDB, DBCP and DCP in the S-1 and S-2 zones (Figure 4). These concentrations generally decrease sharply within a few hundred feet of the former disposal basin, although there is a localized area of elevated pesticide concentrations (approximately 2000 ppb) in the S-2 zone near the intersection of Caricia and Arroyo in Mace Ranch. The pesticide plume in the deeper, less contaminated A-1 zone extends northwest from the disposal basin area to approximately Entrada Drive.

Groundwater Contamination: Carbon Tetrachloride

Figure 4 shows the approximate extent of carbon tetrachloride in groundwater. The grain storage building is the likely source of the carbon tetrachloride plume. Though

its use is not specifically documented at the Frontier Fertilizer site, carbon tetrachloride has a long history of use as a grain fumigant. Current data indicates that the carbon tetrachloride plume extends from the grain storage building to at least the intersection of Caricia and Alegre. Even though the carbon tetrachloride plume extends further underneath the subdivision than the pesticide plume, the contaminant concentrations are much lower. The highest carbon tetrachloride concentration was detected in the field just north of the Frontier site.

What's Next ?

Additional monitoring wells

EPA is proposing to install three groundwater well clusters to better monitor the contaminant plumes. These wells would be located in the southern part of the Mace Ranch development. We expect to hold a public meeting in early 2003 to discuss this project and answer questions before we decide on final well locations.

Improved extraction well system

In the fall and winter of 2002, EPA plans to rehabilitate the existing extraction wells and test them to determine the best pumping rate for each. This will help us determine which existing extraction wells will be incorporated into the expanded pump-and-treat system. The testing will also provide data for the groundwater model that will help determine where to place additional extraction wells. We plan to construct the remainder of the expansion to the

Information Repositories

Public information repositories have been established at the following locations to provide Davis community members and other interested parties with ready access to technical reports and other information regarding the Frontier Fertilizer site.

Yolo County Library, Davis Branch

Attn: Marilyn Cocoran
315 E. Fourteenth St.
Davis, CA 95616



Shields Library

Government Documents Department
Attn: Linda Kennedy
University of California
Davis, CA 95616
(916) 752-1624

groundwater treatment system beginning next spring, including the groundwater conveyance pipeline and additional extraction wells. Again, EPA will provide an opportunity for residents to meet with us to share concerns and ask questions before we make final plans for construction.



MAILING LIST COUPON

If you did not receive this fact sheet in the mail and would like to be included on the mailing list for the Frontier Fertilizer Superfund site, please fill out this coupon and return it to the address below.

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Please return to:

Don Hodge

Community Involvement Coordinator

75 Hawthorne Street (SFD-3)

San Francisco, CA 94105-3901

You may also provide the above information via email to: hodge.don@epa.gov



FOR MORE INFORMATION

If you have **Questions or Concerns** about EPA's cleanup efforts
for the Frontier Fertilizer Site, please contact:


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